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10/659,725	09/10/2003	Momtaz N. Mansour	T127 1010.1	3878

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EXAMINER	
MERKLING, MATTHEW J	
ART UNIT	**PAPER NUMBER**
1795	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/659,725	MANSOUR ET AL.	
	Examiner	Art Unit	
	MATTHEW J. MERKLING	1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *02 April 2008*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *19-23,25-31,33-38,40-43,45,94-103,105-112 and 114* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *19-23,25-31,33-38,40-43,45,94-103,105-112 and 114* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 19, 20, 33 and 94 is rejected under 35 U.S.C. 103(a) as being unpatentable over Atwell (US 2,680,065) in view of Mansour et al. (US 5,306,481).

Regarding claims 19, 33, 94, Atwell discloses a process for producing a product gas having heat or fuel value (col. 5 lines 73-75) comprising:

feeding a carbonaceous material (coal) to a first fluidized bed (37), the first fluidized bed containing particles suspended in a fluid medium (i.e. fluidized bed, col. 4 lines 33-43);

indirectly heating the first fluidized bed with a combustion device (52), at least a portion of the carbonaceous material being gasified to form a first product gas stream (38);

extracting bed solids containing carbon from the first fluidized bed (via conduit 46) and feeding the extracted solids to a second fluidized bed/solids collection reservoir (44) separate from the first fluidized bed, the second fluidized bed being at a temperature higher than the temperature of the first fluidized bed (gas from combustion zone, 52, is fed to second fluidized bed first, and subsequently to the first fluidized bed, thus, making

a higher temperature in the second fluidized bed, see diagram in Fig. 2, col. 5 lines 13-40), the second fluidized bed having a fluidizing medium comprising steam and an oxygen-containing gas (see O_2 and steam indication in Fig. 2, conduit 43), wherein:

a first portion of the extracted bed solids is oxidized in the second fluidized bed and a second portion of the extracted bed solids is endothermically converted to a gas in the second fluidized bed, to thereby form a second product gas stream (gasification/partial oxidation, col. 4 lines 33-68).

Atwell teaches a method and apparatus for gasifying carbonaceous materials in which a combustion heat source (52) indirectly heats the first fluidized bed (37), but does not explicitly teach a pulse combustion device.

Mansour also discloses a method and apparatus for gasifying carbonaceous materials (such as black liquor) in a fluidized bed (see abstract).

Mansour teaches resonant tubes (5) extending into the fluid-bed reactor (1) which are coupled to a pulse combustor (2) in order to provide a more efficient heat transfer mechanism between the combustion device and the fluidized bed (C11/L24-30).

It would have been obvious to one of ordinary skill in the art at the time of the invention to add the pulse combustor of Mansour to the combustion device/heat exchanger of Atwell as a way to improve the efficiency of the heat transfer between the combustion device and the fluidized bed.

Regarding claim 20, while Atwell does not explicitly disclose the first fluidized bed operated at a temperature of less than 1150 degrees F. However, process variables (ie temperature and pressure) are considered results effective variables and are not

considered to confer patentability to the claim. As such, without showing unexpected results, the claimed process variables (i.e. temperature and pressure) cannot be considered critical. Accordingly, one of ordinary skill in the art at the time the invention was made would have optimized, by routine experimentation, the temperature and pressure to obtain the desired results (In re Boesch, 617 F. 2d. 272,205 USPQ 215 (CCPA 1980)). Since it has been held that where general conditions of the claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art (In re Aller, 105 USPQ 223).

3. Claims 19-22, 25, 26, 28-31, 33-37, 40-43, 45, 94-99, 101-103, 105-109, 111 and 112 are rejected under 35 U.S.C. 103(a) as being unpatentable over Monacelli et al. (US 5,752,994) in view of Mansour (US 5,306,481) and Ashworth (US 4,097,361).

Regarding claims 19, 33, 34, 40, 94, 101, 106, 111 and 112, Monacelli discloses a process for producing a product gas having heat or fuel value (see abstract) comprising:

feeding a carbonaceous material (such as black liquor, see title) to a first fluidized bed (low temperature gasifier, 54), wherein the first fluidized bed containing particles suspended in a fluid medium (such as sodium carbonate, col. 58-60) ;

indirectly heating the first fluidized bed with a combustion device (62), at least a portion of the carbonaceous material being gasified to form a first product gas stream (which exits through conduit 58, see Fig. 3);

extracting bed solids containing carbon from the first fluidized bed (via conduit 64, col. 5 lines 37-42), the second fluidized/solids collection reservoir bed being at a

temperature higher than the temperature of the first fluidized bed (col. 6 lines 30-39), the second fluidized bed having a fluidizing medium comprising steam and an oxygen-containing gas (col. 6 lines 7-20), wherein:

Monacelli, however, does not explicitly disclose the first fluidized bed containing a pulse combustion device.

Mansour also discloses a method and apparatus for gasifying carbonaceous materials (such as black liquor) in a fluidized bed (see abstract).

Mansour teaches resonant tubes (5) extending into a fluid-bed reactor (1) which are coupled to a pulse combustor (2) in order to provide a more efficient heat transfer mechanism between the combustion device and the fluidized bed (C11/L24-30).

It would have been obvious to one of ordinary skill in the art at the time of the invention to add the pulse combustor of Mansour to the combustion device/heat exchanger of Monacelli as a way to improve the efficiency of the heat transfer between the combustion device and the fluidized bed.

Furthermore, Monacelli teaches a process in which a low temperature fluidized bed (54) is heated in part by the combustion of carbon materials contained in a second fluidized bed (78, as discussed above) and further discloses the extraction of bed solids from the first fluidized bed, wherein the bed solids are reintroduced into the bed, but does not explicitly disclose that these bed solids are introduced into the second separate fluidized bed.

Ashworth also discloses a process in which two fluidized beds (30 and 40) are arranged in series, wherein the solids from the first fluidized bed (30, wherein an

endothermic reaction takes place, gasification/pyrolysis) are extracted and sent to the second fluidized bed (40, see Fig. 2).

Ashworth teaches that the second fluidized bed partially combusts unreacted carbon (as evidenced by the production of combustible fuel gas from the fluidized bed reactor 40, col. 7 lines 2-7) in order to provide required heat for the first fluidized bed (partial combustion of char in the 40 provides heat necessary for the first fluidized bed 30, see abstract). In this teaching, Ashworth discloses producing heat as well as fuel gas which is utilized downstream (see flow diagram of Fig. 2).

As such, it would have been obvious to one of ordinary skill in the art at the time of the invention to take the extracted solid bed materials from the first fluidized bed (54, comprising unreacted carbon) of Monacelli (via conduit 64) and provide the unreacted carbon to the separate second fluidized bed (76) and operate the second fluidized bed in such a way as to produce heat for the first fluidized bed as well as producing a product fuel gas (as taught by Ashworth, via partial oxidation (endothermic and exothermic reactions taking place) in order to produce more product fuel gas with a fuel value.

Regarding claim 20, Monacelli discloses a process as defined in claim 19, wherein the first fluidized bed is maintained at a temperature of less than about 1150 degrees F (C6/L20-25).

Regarding claim 21, Monacelli discloses a process as defined in claim 19, wherein the carbonaceous material comprises black liquor (C4/L13).

Regarding claim 25, Monacelli discloses a process as defined in claim 19, wherein the portion of the carbonaceous material gasified in the first fluidized bed is endothermically converted to a gas (C3/L63-67).

Regarding claim 26, Monacelli discloses a process as defined in claim 19, wherein the fluidized bed particles contained in the first fluidized bed and the second fluidized bed comprise sodium carbonate (C1/L49-57).

Regarding claim 28, Monacelli further discloses the second product gas stream is filtered in order to remove entrained solids (C6/L40-46).

Regarding claim 29, Monacelli discloses a process as defined in claim 19, wherein bed solids are periodically extracted from the second fluidized bed (C6/L30-45).

Regarding claim 30, Monacelli discloses a process as defined in claim 29, wherein the re-circulated bed solids are mixed with the carbonaceous material being injected into the first fluidized bed (C6/L40-45).

Regarding claim 31, Monacelli discloses a process as defined in claim 19, wherein the first product gas stream is combined with the second product gas stream (C6/L8-51, disclosing that product gases are circulated between upper and lower beds, therefore combining the product gas streams).

Regarding claims 35, 36, 97, 98, 107 and 108, Monacelli discloses a process as defined in claims 33 and 94, wherein the fluidized bed is maintained at a temperature of less than about 1100 degrees F (C6/L20-25).

Regarding claims 22, 37, 99 and 109, Monacelli discloses a process as defined in claims 33 and 94, wherein the first product gas stream is fed to a filtering device for

filtering solids entrained in the product gas stream, the filtered solids being recirculated back to the fluidized bed (C4/L18-21).

Regarding claims 41 and 102, Monacelli discloses a process as defined in claims 33 and 94, wherein the carbonaceous material comprises black liquor (C4/L13).

Regarding claims 42, 43, 45, 95, 96, 103 and 105, Monacelli discloses the particles suspended in the fluidized bed comprise sodium carbonate (col. 3 lines 27-38) and the fluidizing medium comprises steam (col. 2 lines 51-54), the carbonaceous material being fed to the fluidized bed comprising black liquor (see abstract), a majority of the black liquor being steam reformed in the fluidized bed, and wherein a portion of the carbon particles that have accumulated in the bottom portion of the fluidized bed are oxidized, while another portion of the carbon particles are steam reformed.

While Monacelli does not explicitly disclose steam reforming of the black liquor, the claimed and prior art product(s) are identical or substantially identical, or are produced by identical or substantially identical process(es) the burden of proof is on applicant to establish that the prior art product(s) do not necessarily or inherently possess the characteristics of the instantly claimed product(s), see In re Best, 195 USPQ 430.

4. Claims 19-22, 25, 27-31, 33-37, 40-42, 94-99, 101, 102 and 114 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ashworth (US 4,097,361) in view of Mansour et al. (US 5,306,481).

Regarding claims 19, 25, 33, 34, 40, 94, 101 Ashworth discloses a process for producing a product gas having heat or fuel value (see abstract) comprising:

feeding a carbonaceous material (can process a variety of carbon containing fuels, see abstract) to a first fluidized bed (30), wherein the first fluidized bed containing particles suspended in a fluid medium (fluidized bed, see abstract, col. 3 lines 64-68);

at least a portion of the carbonaceous material being gasified to form a first product gas stream (inherently from pyrolysis/gasification occurring in fluidized bed 40);

extracting bed solids containing carbon (via conduit and valve 84) from the first fluidized bed and feeding the extracted solids to a second fluidized bed/solids collection reservoir (40, col. 12 lines 26-33) separate from the first fluidized bed (see Fig. 2), the second fluidized bed being at a temperature higher than the temperature of the first fluidized bed (see abstract), the second fluidized bed having a fluidizing medium comprising steam (via conduit 36, see Fig. 2) and an oxygen-containing gas (via conduit 141, see Fig. 2), wherein:

a first portion of the extracted bed solids is oxidized in the second fluidized bed and a second portion of the extracted bed solids is endothermically converted to a gas in the second fluidized bed, to thereby form a second product gas stream (see col. 7 lines 2-7 which discloses that partial oxidation occurs in gasification zone 40 in order to produce heat as well as low BTU fuel gas).

The method of Ashworth teaches utilizing heat from the partial combustion of char in second fluidized bed (40) as the sole source of heat required for the first fluidized bed (30, see abstract). As such, Ashworth does not teach a pulse combustion device which heats the first fluidized bed where an endothermic reaction takes place.

Mansour also discloses a method and apparatus for endothermically generating a fuel gas from carbonaceous materials in a fluidized bed (see abstract).

Mansour teaches resonant tubes (5) extending into a fluid-bed reactor (1) which are coupled to a pulse combustor (2) in order to provide a more efficient heat transfer mechanism between the combustion device and the fluidized bed (col. 11 lines 24-30).

As such, adding the pulse combustor of Mansour to the first fluidized bed of Ashworth would have been obvious to one of ordinary skill in the art a the time of the invention as a means to supplement the sole heat source for the endothermic reaction which takes place in the first fluidized bed with a highly efficient means to add heat.

Furthermore, such a modification would amount to nothing more than applying a known technique to a known device to yield predictable results.

Regarding claims 20, 35, 36, 97 and 98, Ashworth discloses the first fluidized bed (30) is operated at 925 degrees F (col. 15 lines 44-47).

Regarding claims 21, 41 and 102, Ashworth discloses a process which can suitably handle a variety of carbonaceous materials, but does not explicitly disclose black liquor. However, it is well known in the art that black liquor is a carbonaceous material that is acceptable for gasification processes. As such, it would have been obvious to one of ordinary skill in the art to use the process of Ashworth to process a carbonaceous stream that comprises carbon rich black liquor.

Regarding claims 22, 37 and 99, Ashworth further discloses the first product gas stream (94a) is fed to a filtering device (95a) for filtering solids entrained in the first

product gas stream, the filtered solids being recirculated back to the first fluidized bed (see flow directions in Fig. 2).

Regarding claim 27, Ashworth further discloses the second fluidized bed (40) is heated by oxidizing carbon in the bed, and without an external heat source (via the exothermic combustion of char, as discussed above).

Regarding claim 28, Ashworth further discloses the second product gas stream is filtered in order to remove entrained solids (via cyclone 95, see Fig. 2).

Regarding claims 29 and 30, Ashworth further discloses the entrained solids removed from the second product gas stream are recirculated (see flow directions of Fig. 2).

Regarding claim 31, Ashworth further discloses the first product gas stream is combined with the second product gas stream (see flow directions in Fig. 1 which discloses rejoining the two product gasses to be steam reformed together).

Regarding claim 42, Ashworth further discloses a steam reformer (70) which processes the product gas (see Fig. 1).

Regarding claim 95, Ashworth further discloses the fluid medium in the fluidized bed (30) comprises steam (via conduit 31, see Fig. 2).

Regarding claim 96, Ashworth further discloses at least a portion of the carbonaceous material fed to the fluidized bed is steam (inherently by presence of steam at the temperatures of fluidized bed 30).

Regarding claim 114, Ashworth further discloses the extracted solids (via conduit 36) and oxygen-containing gas (via conduit 141) are separately introduced to the second fluidized bed (see Fig. 2).

5. Claims 23, 38, 100 and 110 are rejected under 35 U.S.C. 103(a) as being unpatentable over Monacelli et al. (US 5,752,994), Mansour (US 5,306,481) and Ashworth (US 4,097,361) as applied to claims 19, 33, 94 and 106 above, and further in view of Tanca (US 5,624,470).

Regarding claims 23, 38, 100 and 110, modified Monacelli discloses all of the limitations of the process as defined in claims 19, 33, 94 and 106, and wherein the fluidizing medium fed to the second fluidized bed contains oxygen (C6/L52-60), but does not explicitly disclose in a stoichiometric amount of less than about 50% based on the amount of carbon in the bed.

Tanca discloses black liquor gasification carried out with oxygen in the range of 20-50% to result in gasification of more than 60-99% (C2/L26-45), and it would have been obvious to one of ordinary skill in the art at the time of the invention to modify Monacelli to carry out the gasification reaction at stoichiometric amount of less than about 50% based on the amount of carbon in the bed for the desired resulting gasification products as such a modification is a result effective variable, where one skilled in the art would recognize to optimize a process variable by routine experimentation, for example in this case, control the results of the gas produced (Tanca, C2/L25-45). See In re Boesch, 617 F.2d 272, 276 (CCPA 1980); MPEP 2144.05.

6. Claim 23, 38 and 100 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ashworth (US 4,097,361) and Mansour et al. (US 5,306,481), as applied to claims 19, 33 and 94 above, and further in view of Tanca (US 5,624,470).

Regarding claims 23, 38 and 100, discloses all of the limitations of the process as defined in claim 33, but does not wherein the gaseous medium fed through the solids collection reservoir contains oxygen in a stoichiometric amount less than about 50%.

Tanca discloses black liquor gasification carried out with oxygen in the range of 20-50% to result in gasification of more than 60-99% (C2/L26-45), and it would have been obvious to one of ordinary skill in the art at the time of the invention to modify Mansour to carry out the gasification reaction at stoichiometric amount of less than about 50% based on the amount of carbon in the bed for the desired resulting gasification products as such a modification is a result effective variable, where one skilled in the art would recognize to optimize a process variable by routine experimentation, for example in this case, control the results of the gas produced (Tanca, C2/L25-45). See In re Boesch, 617 F.2d 272, 276 (CCPA 1980); MPEP 2144.05.

Response to Arguments

7. Applicant's arguments regarding the combination of Atwell and Mansour on pages 10 and 11 have been fully considered but they are not persuasive.

On pages 10 and 11, Applicant argues that the pulse combustion device of Mansour cannot be used in the method of Atwell because Atwell teaches the combustion of solid particles in the combustor, whereas the pulse combustor of Mansour cannot process these solids. The

examiner respectfully disagrees with this argument. As stated by Atwell, gas can also be used to fuel the combustion zone (col. 5 lines 8-12).

Furthermore, on page 11, Applicant argues that if the pulse combustor of Mansour is used in the method of Atwell, the first fluidized bed (37) would be at a higher temperature than the second fluidized bed (44). The examiner respectfully disagrees with this argument. Atwell clearly indicates the preference for operating the second fluidized bed at a higher temperature than the first, and Applicant provides no reason for the statement that the use of a pulse combustor in Atwell would inherently lead to a higher temperature in the first fluidized bed.

8. Applicant's arguments, see page 13, filed 4/2/08, with respect to the rejection(s) in view of Monacelli have been fully considered and are persuasive. Specifically, Applicant's argument that Monacelli does not teach endothermically converting a portion of lower bed 76 into a gas. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of Monacelli et al. (US 5,752,994), Mansour (US 5,306,481) and Ashworth (US 4,097,361).

Conclusion

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to MATTHEW J. MERKLING whose telephone number is (571)272-9813. The examiner can normally be reached on M-F 8:30-4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Alexa Neckel can be reached on (571) 272-1446. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/M. J. M./
Examiner, Art Unit 1795

/Alexa D. Neckel/
Supervisory Patent Examiner, Art Unit 1795